

Amendments to the Claims:

The following listing of claims will replace all prior versions, and listings, of claims in the application:

1. (Currently Amended) A method for constructing a composite image of at least a portion of an object based on a plurality of source images, each of the plurality of source images including at least that portion of the object, each of the plurality of source images corresponding to a different focal plane with respect to the object, the method comprising:

determining a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image, wherein the determining includes performing a first type of analysis of the plurality of source images at at least some of a plurality of spatial locations in the source images; and

determining a second set of pixels of the composite image corresponding to surfaces in the composite image, wherein the determining includes performing a second type of analysis of the plurality of source images at at least some of the plurality of spatial locations in the source images, and

at least one of determining the first set of pixels and determining the second set of pixels includes at least one operation that suppresses at least some pixels corresponding to at least partially out-of-focus edges or boundaries in the source images from being included in the composite image, wherein:

the first set of pixels of the composite image is determined before the second set of pixels of the composite image is determined;

the second set of pixels is determined at spatial locations outside of the spatial locations corresponding to the first set of pixels, and

determining the second set of pixels of the composite image comprises:

selecting the respective pixels of the second set of pixels based at least partially on an analysis of focus at respective spatial locations in the plurality of source images; and

selecting the respective pixels of the second set of pixels such that a corresponding map of the second set of pixels would include surface region segments of a predetermined minimum size where the source images corresponding to the respective pixels at all of the respective spatial locations included in a surface region segment provide at least one of a limited number of adjacent source image focal planes and a limited distance between the focal planes of the source images.

2-4. (Canceled)

5. (Currently Amended) The method of ~~claim 4~~claim 1, wherein

the step of selecting the respective pixels of the second set of pixels based at least partially on an analysis of focus may indicate that no source image exhibits satisfactory focus within the at least one of a limited number of adjacent source image focal planes and a limited distance between the focal planes of the source images at certain spatial locations included in a respective surface region segment, and

the step of selecting the respective pixels of the second set of pixels, such that a corresponding map of the second set of pixels would include surface region segments and selects respective filler pixels of the second set of pixels at those certain spatial locations such that the respective filler pixels correspond to the at least one of a limited number of adjacent source image focal planes and a limited distance between the focal planes of the source images associated with the respective surface region segment.

6. (Currently Amended) The method of claim 1, ~~wherein the at least one operation that suppresses at least some pixels corresponding to at least partially out of focus edges or boundaries comprises:~~further comprising:

determining at least one pixel in the second set of pixels of the composite image that lies at least a prescribed setback distance away from each pixel of the first set of pixels of the composite image, the setback distance being a spatial distance, and

subsequently determining at least one pixel in the second set of pixels of the composite image that lies at a distance less than the prescribed setback distance away from at least one pixel of the first set of pixels of the composite image, based at least partially on a characteristic associated with ~~at~~ the at least one pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each pixel of the first set of pixels of the composite image.

7. (Previously Presented) The method of claim 6, wherein:

the at least one pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each pixel of the first set of pixels of the composite image comprises a seed pixel;

the subsequently determined at least one pixel in the second set of pixels that lies at a distance less than the prescribed setback distance away from at least one pixel of the first set of pixels of the composite image is determined based on a grown region including the seed pixel and having extents governed at least partially by the characteristic associated with the at least one pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each pixel of the first set of pixels, and

the characteristic associated with the at least one pixel in the second set of pixels of the composite image that lies at least the prescribed setback distance away from each of the pixel of the first set of pixels comprises at least one of a source image identification, a source image index, and a source image focal plane location.

8. (Original) The method of claim 1, wherein at least one of the first type of analysis and the second type of analysis is based on at least one of grayscale image intensities and color image intensities.

9. (Canceled)

10. (Currently Amended) The method of ~~claim 9~~claim 1, wherein the first ~~numerical characterization~~type of analysis comprises at least one of a gradient analysis, a gradient derivative analysis, spatial filtering, and Gaussian spatial filtering.

11-12. (Canceled)

13. (Currently Amended) The method of ~~claim 9~~claim 1, wherein determining the first set of pixels of the composite image ~~at respective spatial locations~~ comprises:

determining a preliminary first set of pixels at respective spatial locations such that the preliminary first set of pixels comprises respective source image edge pixels having a respective indicated degree of focus that is at least one of a satisfactory indicated degree of focus and a best indicated degree of focus available among the source images at the corresponding respective spatial location; and

the at least one operation that suppresses at least some pixels corresponding to at least partially out-of-focus edges or boundaries comprises subsequently refining the preliminary first set of pixels by eliminating respective pixels that have a respective indicated degree of focus that is quantitatively poorer than a numerical criterion based on the indicated degree of focus of its connected neighbors in the preliminary first set.

14. (Canceled)

15. (Currently Amended) The method of claim ~~14~~1, wherein the second ~~numerical characterization~~type of analysis comprises at least one of a texture classification analysis, a contrast classification analysis, a texture classification analysis including a variance analysis, and a fractal dimension analysis.

16-19. (Canceled)

20. (Currently Amended) A recording medium that stores a control program, the control program executable on a computing device, the computing device couplable to a vision system, the control program including instructions for constructing an adequately focused composite image of at least a portion of an object based on a plurality of source images of at least that portion of the object, the plurality of source images corresponding to a plurality of focal planes with respect to the object, the instructions comprising:

instructions for determining a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image, wherein the determining includes performing a first type of analysis of the plurality of source images, images at at least some of a plurality of spatial locations in the source images, to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image; and

instructions for determining a second set of pixels of the composite image corresponding to surfaces in the composite image, wherein

the determining includes performing a second type of analysis of the plurality of source images, images at at least some of the plurality of spatial locations in the source images, and

at least one of determining the first set of pixels and determining the second set of pixels of the composite image includes at least one operation that suppresses at least some pixels corresponding to surfaces at least partially out-of-focus edges or boundaries in the source images from being included in the composite image, wherein:

the first set of pixels of the composite image is determined before the second set of pixels of the composite image is determined;

the second set of pixels is determined at spatial locations outside of the spatial locations corresponding to the first set of pixels, and

determining the second set of pixels of the composite image comprises:

selecting the respective pixels of the second set of pixels based at least partially on an analysis of focus at respective spatial locations in the plurality of source images; and

selecting the respective pixels of the second set of pixels such that a corresponding map of the second set of pixels would include surface region segments of a predetermined minimum size where the source images corresponding to the respective pixels at all of the respective spatial locations included in a surface region segment provide at least one of a limited number of adjacent source image focal planes and a limited distance between the focal planes of the source images.

21. (Canceled)

22. (Currently Amended) A vision system comprising an imaging system, a vision system controller, a memory portion, and a composite image processor operable to construct an adequately focused composite image of at least a portion of an object based on a plurality of source images of at least that portion of the object, the plurality of source images corresponding to a plurality of focal planes with respect to the object, the composite image processor comprising:

an edge processing portion that performs a first type of analysis of the plurality of source images, at at least some of a plurality of spatial locations in the source images, to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image; and

a surface processing portion that performs a second type of analysis of the source images, at at least some of the plurality of spatial locations in the plurality of source

images, to determine a second set of pixels of the composite image corresponding to surfaces in the composite image, the surface processing portion suppressing image artifacts which correspond to out-of-focus edges or boundaries included in the plurality of source images by including in the second type of analysis both a focus criterion and operations which overrule the focus criterion proximate to the first set of pixels.

23. (Original) The vision system of claim 22, wherein:

the edge processing portion comprises:

a source image edge processing portion usable to provide a first characterization of the source images at the at least some of the plurality of spatial locations, the first characterization usable to indicate adequately focused edges or boundaries included in the source images, and

a composite image edge determining portion that determines the first set of pixels of the composite image based on the first characterization provided by the source image edge processing portion; and

the surface processing portion comprises:

a source image surface processing portion usable to provide a second characterization of the source images at the at least some of the plurality of spatial locations, the second characterization usable to indicate adequately focused surface regions included in the source images; and

a composite image surface determining portion for determining the second set of pixels of the composite image based on the second characterization provided by the source image surface processing portion.

24-25. (Canceled)

26. (Original) The vision system of claim 22, wherein the composite image processor is part of a general computerized control system of the vision system.

27. (Original) The vision system of claim 26, wherein the general computerized control system further comprising a control instruction generation system operable to generate at least one of a part program instruction, an inspection program control instruction, and a composite image processor control instruction, the generated instruction usable to operate the composite image processor to construct a desired representation of a composite image.

28. (New) A method for controlling a composite image processor of a vision system, the vision system comprising an imaging system, a vision system controller, a memory portion, and the composite image processor, the composite image processor operable to construct an adequately focused composite image of at least a portion of an object based on a plurality of source images of at least that portion of the object, the plurality of source images corresponding to a plurality of focal planes with respect to the object, the method comprising:

performing a first type of analysis of the plurality of source images, at at least some of a plurality of spatial locations in the source images, to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image; and

performing a second type of analysis of the source images, at at least some of the plurality of spatial locations in the plurality of source images, to determine a second set of pixels of the composite image corresponding to surfaces in the composite image,

wherein performing the second type of analysis comprises suppressing image artifacts which correspond to out-of-focus edges or boundaries included in the plurality of source images by including in the second type of analysis both a focus criterion and operations which overrule the focus criterion proximate to the first set of pixels.

29. (New) A vision system comprising an imaging system, a vision system controller, a memory portion, and a composite image processor operable to construct an

adequately focused composite image of at least a portion of an object based on a plurality of source images of at least that portion of the object, the plurality of source images corresponding to a plurality of focal planes with respect to the object, the composite image processor comprising:

an edge processing portion that performs a first type of analysis of the plurality of source images, at at least some of a plurality of spatial locations in the source images, to determine a first set of pixels of the composite image corresponding to at least one of edges and boundaries in the composite image; and

a surface processing portion that performs a second type of analysis of the source images, at at least some of the plurality of spatial locations in the plurality of source images, to determine a second set of pixels of the composite image corresponding to surfaces in the composite image,

wherein:

the edge processing portion determines the first set of pixels of the composite image before the surface processing portion determines the second set of pixels of the composite image; and

the surface processing portion determines the second set of pixels at spatial locations outside of the spatial locations corresponding to the first set of pixels by:

selecting the respective pixels of the second set of pixels based at least partially on an analysis of focus at respective spatial locations in the plurality of source images; and

selecting the respective pixels of the second set of pixels such that a corresponding map of the second set of pixels would include surface region segments of a predetermined minimum size where the source images corresponding to the respective pixels at all of the respective spatial locations included in a surface region segment provide at

least one of a limited number of adjacent source image focal planes and a limited distance between the focal planes of the source images.

30. (New) The vision system of claim 29, wherein:

the edge processing portion comprises:

a source image edge processing portion usable to provide a first characterization of the source images at the at least some of the plurality of spatial locations, the first characterization usable to indicate adequately focused edges or boundaries included in the source images, and

a composite image edge determining portion that determines the first set of pixels of the composite image based on the first characterization provided by the source image edge processing portion; and

the surface processing portion comprises:

a source image surface processing portion usable to provide a second characterization of the source images at the at least some of the plurality of spatial locations, the second characterization usable to indicate adequately focused surface regions included in the source images; and

a composite image surface determining portion for determining the second set of pixels of the composite image based on the second characterization provided by the source image surface processing portion.

31. (New) The vision system of claim 29, wherein;

the edge processing portion determines the first set of pixels of the composite image before the surface processing portion determines the second set of pixels of the composite image; and

the surface processing portion determines the second set of pixels such that the second set of pixels does not include any of the pixels of the composite image which have been determined to be in the first set of pixels.

32. (New) The vision system of claim 29, wherein the composite image processor is part of a general computerized control system of the vision system.

33. (New) The vision system of claim 29, wherein the general computerized control system further comprising a control instruction generation system operable to generate at least one of a part program instruction, an inspection program control instruction, and a composite image processor control instruction, the generated instruction usable to operate the composite image processor to construct a desired representation of a composite image.